KSC Technical Requirements Management Process for Station Payloads.

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Introduction

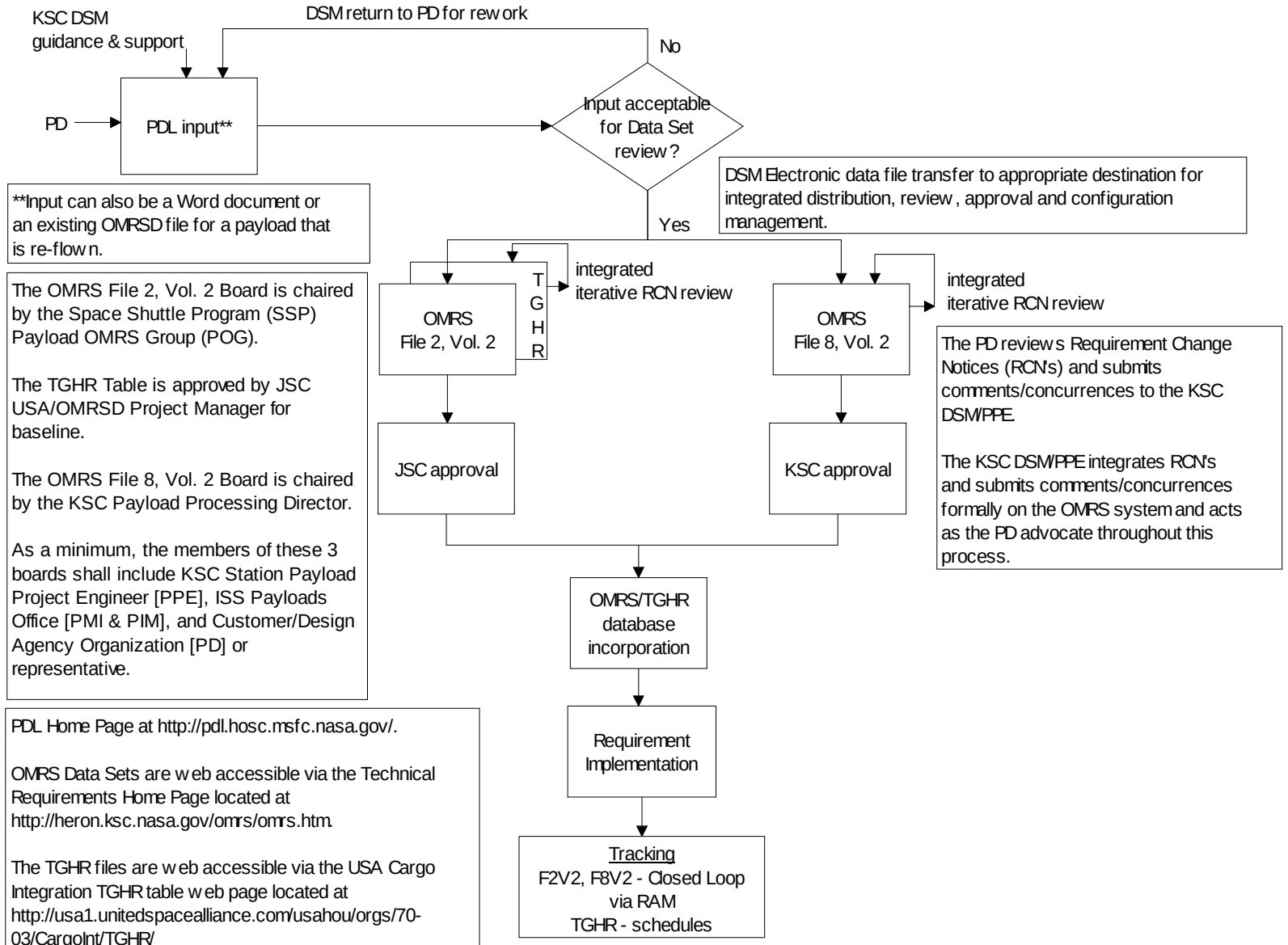
- The KSC goal was to utilize the new Payload Data Library (PDL) input tool and existing input tools while also utilizing the established program level and KSC level configuration control processes of the Operations and Maintenance Requirements and Specifications (OMRS) system.

- The purpose of this presentation is to present the KSC Technical Requirements management process for Station Payloads.

Technical Requirements Definitions

- The OMRSD requirements are used for non-drawing technical requirements which include test, checkout, servicing, pre-planned maintenance, inspection, safety, general, data, time critical operations, and analysis requirements.
- OMRSD File VIII Vol. 2 is for KSC Standalone (non-Orbiter integrated) requirements.
  - OMRSD File II Vol. 2 is for Orbiter integrated requirements (either Middeck Experiment or Payload) to document Interface Verification Test (IVT), monitoring and fitcheck requirements.
  - These technical requirements are documented and closed loop tracked per the OMRS system utilizing the Requirements Allocation Matrix (RAM)
- The Time-critical Ground Handling Requirements (TGHR) Table documents time-critical and schedule-driven requirements for payload integration into the Orbiter Middeck.
  - They are limited to:
    - Late Stow
    - Power Interrupts
    - Orientation Constraints
    - Scrub Turnaround
    - Early Destow (Nominal and EEOM)
  - TGHR Table requirements do not require closed loop tracking because the TGHR table typically documents schedule driven requirements which are not historically tracked in the RAM.

KSC Technical Requirements Management Process for Station Payloads



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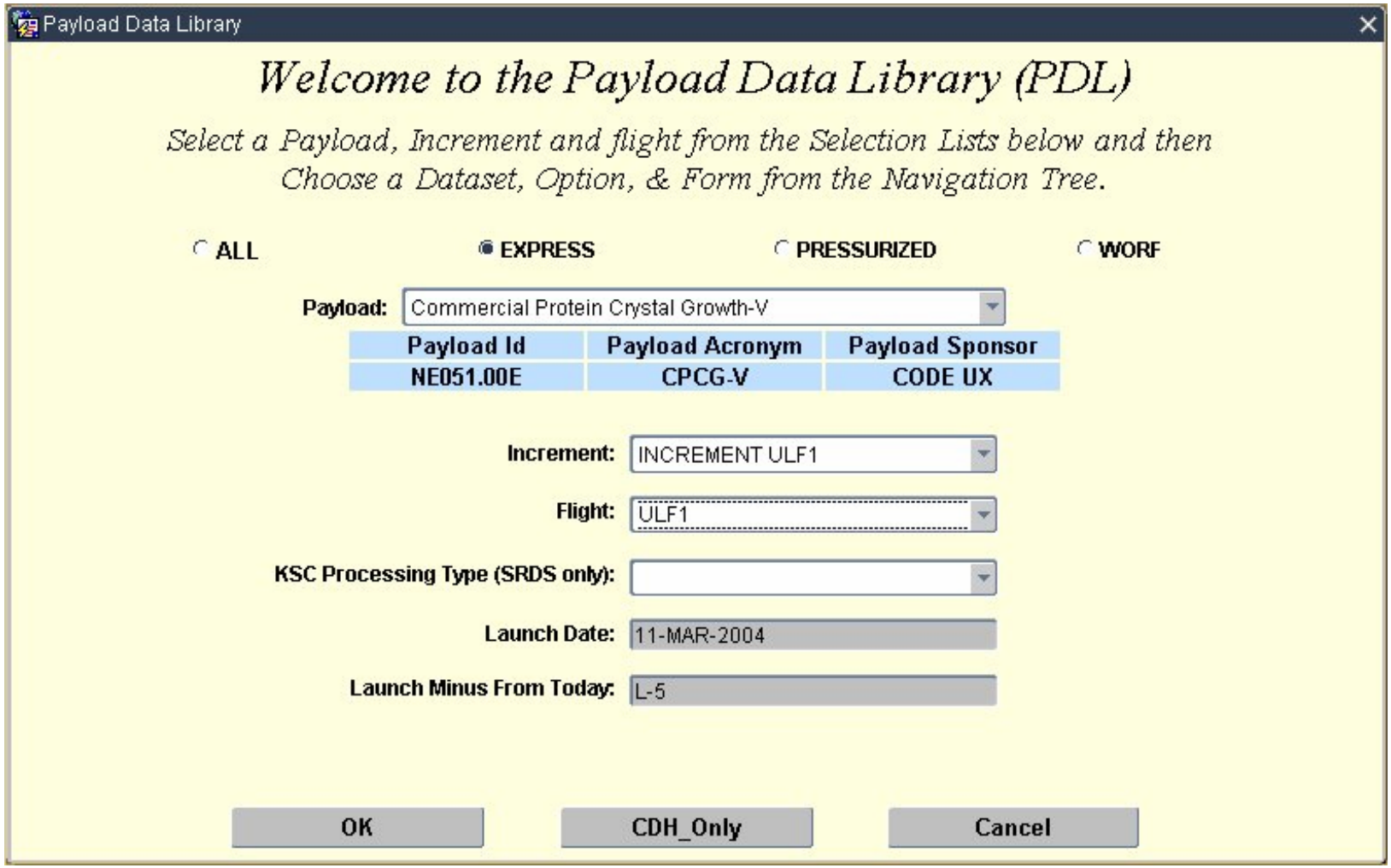
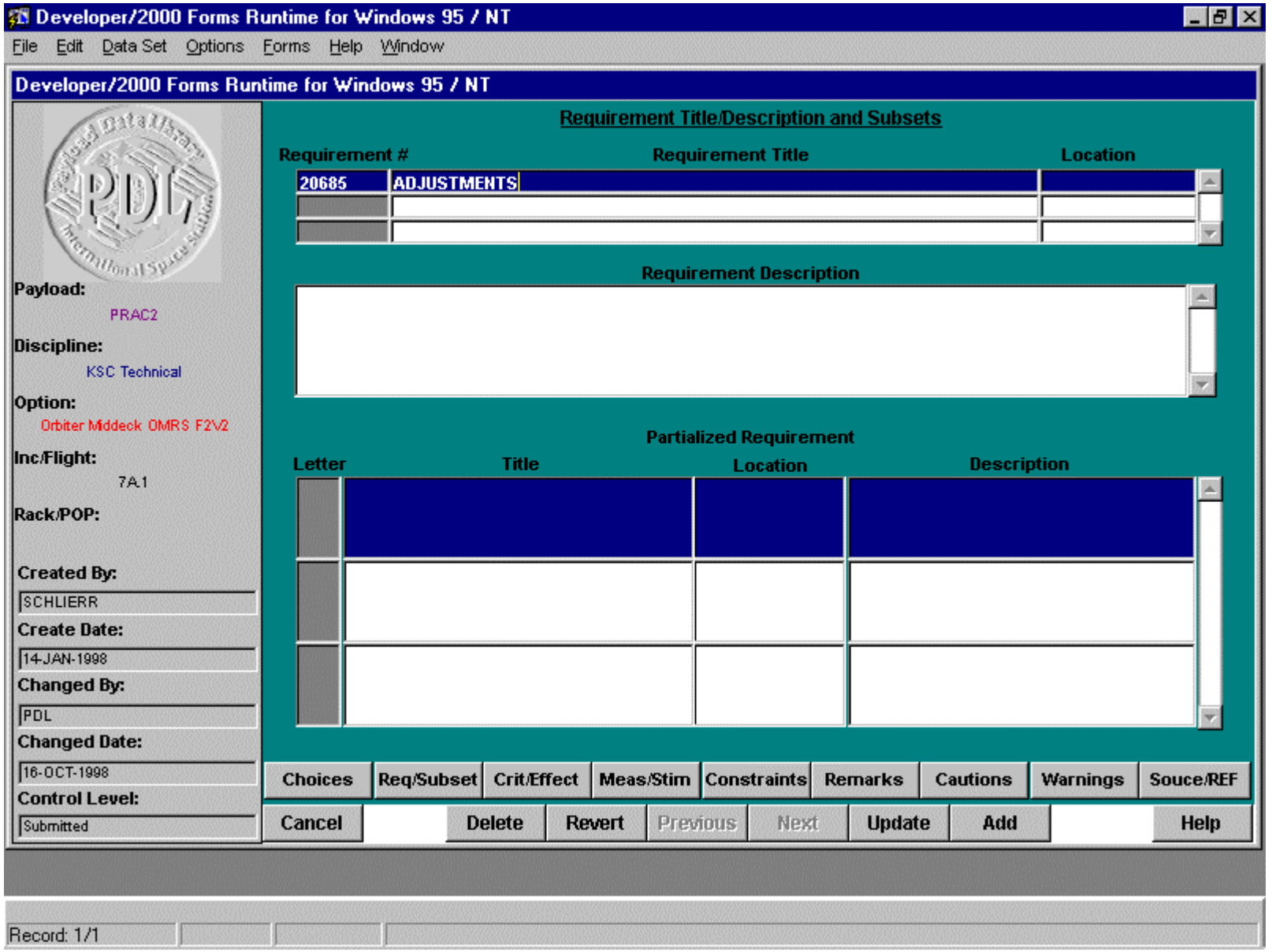
PD PDL Data Entry and Links

- The KSC Technical Requirements Data Set is defined in the Payload Data Set Blank Book SSP 52000-PDS Section 8.
  - Initial Data entry shall be via the PDL per ISS Payloads Office direction
  - The Data Set is divided into 4 deliverable Options with PD promotion to Integrated as follows:
    - UIPT - [OMRS File VIII Volume 2] Approx. L-12 1/2
    - Orbiter P/L Bay - [OMRS File II Volume 2] Approx. L-16
    - Orbiter Middeck - [OMRS File II Volume 2] Approx. L-11
    - Orbiter Middeck - [TGHR] Approx. L-4.5
  - PD selects Data Set, Option, Form, and Requirement Choice from list
  - PD populates the Requirement Description, Partialized (Subset) Requirement, Measurement Stimulus, Constraints, Remarks, Cautions, Warnings, and Reference Documentation
  - PD promotes to Integrated
  - KSC DSM coordinates with the Customer to populate the Effectivity Code, performs an initial screening review of the Data Set input, and ensures that the input is downloaded to the OMRS/TGHR systems for Data Set incorporation.
  - PD performs electronic review, comment, and approval of OMRS/TGHR files related to their payload via PDL link to the KSC OMRS/ACOMC Technical Requirements web site.


Payload Data Library
Welcome to the Payload Data Library (PDL)
Select a Payload, Increment and flight from the Selection Lists below and then
Choose a Dataset, Option, & Form from the Navigation Tree.
ALL
EXPRESS
PRESSURIZED
WORF
Payload:
Commercial Protein Crystal Growth-V
Payload Id
Payload Acronym
Payload Sponsor
NE051.00E
CPCG-V
CODE UX
Increment:
INCREMENT ULF1
Flight:
ULF1
KSC Processing Type (SRDS only):
Launch Date:
11-MAR-2004
Launch Minus From Today:
L-5
OK
CDH_Only
Cancel



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REQUIREMENT NUMBER	REQUIREMENT DESCRIPTION	MEAS/ STIMU	SPECIFICATION	INTERVALS/CONSTRAINTS/REMARKS
U9030FT.030**	C&DH/POIC FUNCTIONAL I/F TEST		SSPF	A:PUSDRUMS
CRIT: NONE				B:
	PERFORM CHECK OUT USING PTCS OF SELECTED POIC COMMAND AND TELEMETRY DATA BASE FUNCTIONS BY SENDING COMMANDS AND FLOWING TELEMETRY.			C:C-1: KSC POIC EHS SYSTEMS AND PL TREK SYSTEM SHALL BE USED C-2: KSC POIC COMMAND AND TELEMETRY DATABASES SHALL BE USED
U9030FT.030-A	ISSUE/VERIFICATION			
	ISSUE AND VERIFY COMMANDS.		COMMANDS SENT AND EXECUTED	C-3: A SUB-SET OF COMMANDS SHALL BE PERFORMED USING PDSS WITH KSC-EHS R-1: COMMANDS TO BE SELECTED BY TEST TEAM/CUSTOMER
U9030FT.030-B	PROCESS MRDL TELEMETRY			
	DOWN-LINK AND PROCESS MRDL TELEMETRY (REF. R-3, R-4, R-6)		NO DROPPED PACKETS OR HEADER ERRORS AND CUSTOMER VERIFIED CONTENT OF DATA	R-2: PERFORM COMMANDING TO EXPRESS RACK USING EHS WORK STATION R-3: HEALTH & STATUS WILL BE CONTINUOUSLY GENERATED AT 1HZ WHILE PAYLOAD IS POWERED AND PCEM IS OPERATIONAL
U9030FT.030-C	FILE UPLOAD			
	TRANSFER SPECIFIED SOFTWARE FILE TO PCEM		FILE TRANSFER COMPLETE AND CUSTOMER VERIFIED CONTENT OF DATA	R-4: SCIENCE DATA WILL INCLUDE HARDWARE INPUTS AND CORE TECH INFO AT 1 HZ RATE PLUS DIGITAL VIDEO DATA AT MAXIMUM 1MB/SEC RATE
U9030FT.030-D	FILE DOWNLOAD			
	TRANSFER FILE TO EMU		FILE TRANSFER COMPLETE AND CUSTOMER VERIFIED CONTENT OF DATA	R-5: APERIODIC DATA WILL INCLUDE ERROR GENERATIONS, SOFTWARE ERROR CODES AND SYSTEM FAILURE CODES. R-6: ECW WARNING CODE OF VALUE 3 RESULTS IN THE RACK SHUTDOWN COMMAND TO THE EXPRESS RACK, SHUTTING DOWN THE ENTIRE RACK
				D:
U9030FT.040**	VIDEO FUNCTIONAL I/F TEST		SSPF	A:PUSDRUMS
CRIT: NONE				B:
	INTERFACE FUNCTIONAL TEST			C:C-1: ROUTE VIDEO THROUGH KSC VIDEO SET TO SSPF FACILITY VIDEO SWITCHER TO BE DISPLAYED ON CCTV GROUND MONITORS
U9030FT.040-A	OPERATIONAL FIBER OPTIC VIDEO (J16)			

Sample: STS-93 TGHR Table

Revision B **Date: 07/08/99**

Original Signed by Len Landers on 7/8/99

USA OMRSD Project Manager

No.	ITEM	MAX POWER INTERRUPTS (28 +/- 4 VDC)	ORIENTATION CONSTRAINTS	LATE STOW < L- (HR)	SCRUB T/A (HRS / DAYS)	EARLY DESTOW			APPROVAL
						KSC	DFRC	EEOM	
Payload Requirements									
P1	GOSAMR (Aerogel) (h)	None	None	36 hrs	72 hrs	Runway	Runway	MET > 48 hrs KSC-only Best effort- DFRC	Revision B 7/8/99
P2	PGIM	15 min max (j)	Door-down	24 hrs	24 hrs	Runway	Runway	MET > 48 hrs Best effort	Revision A 6/14/99
P3	PGIM Hardware	None	Door-down pre-flight Door-up post-flight	24 hrs	24 hrs	Runway	Runway	MET > 48 hrs Best effort	Basic 3/1/99
P4	STL-B	15 min max	None	24 hrs	24 hrs	Runway	Runway	MET > 48 hrs	Basic 3/1/99
P5	CCM -C	15 min max	None	24 hrs	24 hrs	Runway	Runway	MET > 48 hrs KSC-only Best effort- DFRC	Basic 3/1/99
P6	MEMS	None	None	None (c)	6 Days	Runway	Runway	None	Basic 3/1/99
P7	CGBA (NIH-B)	15 min max	None	24 hrs	48 hrs (d)	Runway	Runway	None	Basic 3/1/99
P8	CGBA (Tissue)	15 min max	None	24 hrs	48hrs (d)	Runway	Runway	None	Basic 3/1/99

NOTES:

(a) The following have no time-critical middeck requirements for this mission: AXAF, MSX, SIMPLEX, SWUIS, SAREX-II, HINGE(LFSAH), DTO 260, DTO 631, DSO 331, DSO 496, DSO 498, DSO 493, DTO 805.

(b) All middeck payloads and experiments external surfaces must be verified visibly clean (Standard Level) prior to orbiter installation.

(c) Activation of the payload prior to launch.

Sample: STS-94 RAM

DATE: 1997/05/19 **SPDMS - OMRS FLOW PLANNING Mission OMP Report** **PAGE:**

TIME: 17:09:58 **OMP: 2914 STS: 094 STS094 RAM** **CLOSURE SY:** **KMR:** **PROGRAM: O**

OMRS NO	CRIT	OMRS TITLE	OMP	WAD NO	RVCH	SEQSTEP	RN	KMR	LD	SYS	ST	R
H300CMIT.150		CM-1 HEALTH & STATUS CHECK	2918	EP-MSL-1R-EXP-CM-1-T102		10-065	1	5O		PAY	C	A
H300CM1M.020		CM-1 FSP PRESSURE CHECK	2918	EP-MSL-01R-EXP-CM-1-T102		09-041	1	5O		PAY	C	A
H300CM1M.100-A		INSTALL AND TORQUE EP CHAMBER	2918	EP-MSL-01R-EXP-CM-1-T100		01-011	1	5O		PAY	C	A
H300CM1M.100-B		REMOVE 3 DPP CARDS AND INSTAL	2918	EP-MSL-01R-EXP-CM-1-T100		02-026	1	5O		PAY	C	A
H300CM1M.100-C		INSTALL LAUNCH DDR	2918	EP-MSL-01R-EXP-CM-1-T100		03-004	1	5O		PAY	C	A
H300CM1M.100-D		INSTALL (4) FLIGHT DUMMY VCR	2918	EP-MSL-01R-EXP-CM-1-T100		04-006	1	5O		PAY	C	A
H300CM1M.150		CM-1 CHAMBER CLEANING	2918	TBD		TBD-TBD	1	99		PAY	O	A
H300DCET.150		DCE HEALTH AND STATUS CHECK	2918	EP-MSL-01R-EXP-DCE-T102		07-073	1	5O		PAY	C	A
H300DTVT.020-A		HI-PAC TO POWER	2918	EP-MSL-01R0EXP-HDTV-T100		02-010	1	5O		PAY	C	A
H300DTVT.020-B		HI-PAC TO RAU	2918	EP-MSL-01R-EXP-HDTV-T100		02-010	1	5O		PAY	C	A
H300DTVT.020-C		HEALTH CHECK	2918	EP-MSL-01R-EXP-HDTV-T100		02-049	1	5O		PAY	C	A
H300EXPM.100		RACK STRUCTURE INSPECTION	2918	SL-MSL-01R-EXPRESS-T100		02-001	1	5O		PAY	C	A
H300EXPT.100		EXPRESS HEALTH AND STATUS CHE	2918	EP-MSL-01REXP-EXPRESS-T102		03-027	1	5O		PAY	C	A
H300GENC.010		SEPARATED INTERFACES	2918	TBD		TBD-TBD	1	99		TBD	O	C
H300IPLT.350		OPF MODULE STOW	2918	P9403		16-001	1	5O		PAY	O	A
H300IPLT.580		EXPERIMENT CLOSEOUT SWITCH LI	2918	L0304		07-028	1	5O		PAY	O	A
H300IPLT.580		EXPERIMENT CLOSEOUT SWITCH LI	2918	L0304		07-030	1	5O		PAY	O	A

Note: This sample RAM file was 23 pages in it's entirety.

KSC Technical Requirements Web Site (Cont) - Existing with New P/L Unique Links

STS-095 OMRS Page

PCGSTES	HOST	CRYOTSU

STS-095

RAM Requirements Allocation Matrix

RCNs

PP04922 P281 - PCG-STES OMRS/TGHR Update

PP04931 P410 - HOST Update

PP04934 P432 - Avionics Interface Update

MAIL

4922 P281 - PCG-STES OMRS/TGHR Update

4931 P410 - HOST Update

4934 P432 - Avionics Interface Update

Exception/Waivers

Files

P01 Shuttle OMRSD General Payload Interface Requirements

P281 Protein Crystal Growth - Single Locker Thermal Enclosure System (PCG-STES)

P410 Hubble Orbital Systems Test (HOST) Baseline

P432 Cryogenic Thermal Storage Unit Flight Experiment

File 1 Operations and Maintenance Requirements and Specifications Document; Intro

Return to OMRS Homepage

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Last Revision: *Monday, June 22, 1998 1048 EDT*

Summary

- The KSC Technical Requirements management process for Station Payloads has been defined.
  - – The KSC Technical Requirements Data Set is resident on the OMRS System.
  - – This process utilizes the PDL or the OMRS/TGHR as the Data Set input tools.
  - – This process utilizes the established OMRS/TGHR system for the distribution, integrated review, configuration management, and closed loop tracking of the Data Set
  - – The KSC Technical Requirements Data Set is to be accessible by the PD through the PDL via the KSC OMRS/ACOMC Technical Requirements Home Page.
  - – The KSC Technical Requirements Data Set configuration management board structure for OMRS File VIII Volume 2 has been defined to reside within the KSC Space Station & Shuttle Payloads Directorate.
  - – The KSC role to act as the PD advocate/integrator to the SSP for PD requirements that impact the orbiter has been defined per ISS Payload Office direction.